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## Economic Commission for Europe

### Inland Transport Committee

### World Forum for Harmonization of Vehicle Regulations

#### 174th session

Geneva, 13-16 March 2018

Item 4.7.5 of the provisional agenda

#### 1958 Agreement:

Consideration of draft amendments

to existing UN Regulations submitted by GRRF

## **Proposal for Supplement 4 to the 02 series of amendments to UN Regulation No. 90 (Replacement braking parts)**

### **Submitted by the Working Party on Brakes and Running Gear\***

The text reproduced below was adopted by the Working Party on Brakes and Running Gear (GRRF) at its eighty-fourth session (ECE/TRANS/WP.29/GRRF/82, para. 25). It is based on official document ECE/TRANS/WP.29/GRRF/2016/18. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee AC.1 for consideration at their March 2018 sessions.

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\* In accordance with the programme of work of the Inland Transport Committee for 2016–2017 (ECE/TRANS/254, para. 159 and ECE/TRANS/2016/28/Add.1, cluster 3.1), the World Forum will develop, harmonize and update UN regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

## **Supplement 4 to the 02 series of amendments to UN Regulation No. 90 (Replacement braking parts)**

*Add a new paragraph 3.3.1.3., to read:*

"3.3.1.3. In the case of brake lining assemblies for vehicles of category L, the list of brake lining assemblies belonging to the same group defined according to Annex 7a. This list shall indicate for each brake lining assembly: name of brake lining assembly manufacturer, the brake lining assembly manufacturer's code, the friction material area (cm<sup>2</sup>).

*Add a new paragraph 4.2.4., to read:*

"4.2.4. In the case of brake lining assemblies for vehicles of category L, brake lining assemblies belonging to the same group defined according to the criteria of Annex 7a, shall be assigned the same approval number of the one assigned to the representative brake lining assembly."

*Amend the paragraph 5.2.1.5., to read (footnote remain unchanged):*

"5.2.1.5. Replacement brake lining assemblies for vehicles of category L

It is allowed the verification of a brake lining assembly deemed to be representative of a group of brake lining assemblies, grouped according to the criteria defined in Annex 7a.

The representative brake lining assembly is deemed to identify the most severe application.

Results obtained with that representative brake lining assembly are considered valid for all the brake lining assemblies belonging to the same group defined according to the grouping criteria as from Annex 7a.

At least one set of the chosen replacement brake lining assemblies, representing the type of lining to be approved, shall be installed and tested in at least one vehicle which is representative of the vehicle type for which approval is sought, according to the prescriptions of Annex 7 and shall satisfy the requirements stated in this annex. The representative vehicle(s) shall be selected from among the application range using a worst case analysis<sup>4</sup>."

*Add a new Annex 7a, as follows:*

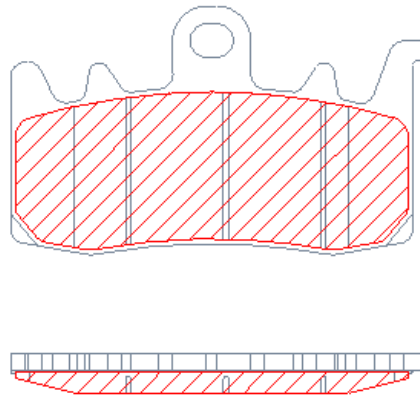
### **"Criteria to define groups of brake lining assembly for vehicles of category L**

1. Grouping criteria

The grouping is made according to the following approach:

- (a) According to the individual friction material of the brake lining;
- (b) Depending on the area of the friction material area of the brake lining assembly operated by the piston/pistons of only one side of the brake caliper.

Friction material area means all the area enclosed within the perimeter of the brake lining (see the red cross-hatched area, Figure 1), thus excluding the presence of any grooves and/or chamfers:

**Figure 1**

3 area groups are foreseen, as in Table 1:

**Table 1**

<i>Group</i>	<i>Brake lining area [cm<sup>2</sup>]</i>
A	≤15
B	> 15 ≤ 22
C	> 22

2. Procedure for selection of the brake lining assembly representative of the group to be approved

The brake lining assembly to be approved is defined, according to the following criteria:

- (a) Choice of friction material to be approved;
- (b) Verification of the applications where the chosen friction material is applied;
- (c) Definition of the area of the selected brake lining assemblies according to Table 1, and classification into groups A – B – C;
- (d) For each group, selection of the most severe application, according to the highest value of the index  $E_p$  (kinetic energy by brake lining area), as follows:

$$E_p = \frac{1}{2} * M * p * (V * c)^2 / (S * q_p)$$

where:

$E_p$  = kinetic energy index [kJ/cm<sup>2</sup>]

$M$  = gross vehicle weight of the vehicle [kg]

$p$  = allocation percentage of the vehicle weight:

- (a) for front braking system:
  - (i) 75 per cent in case of 1 brake disc
  - (ii) 37.5 per cent in case of 2 brake discs

(b) for rear braking system:

(i) 50%

V = vehicle maximum speed [m/s]

c = correction coefficient of speed:

(c) for front braking system = 0.8

(d) for rear braking system: variable according to the brake disc diameter:

(i) 0.5 for  $\varnothing \leq 245$  [mm]

(ii) 0.6 per  $\varnothing > 245 < 280$  [mm]

(iii) 0.75 per  $\varnothing \geq 280$  [mm]

S = brake lining area as defined in Table 1 [cm<sup>2</sup>].

Q<sub>p</sub> = number of pads in 1 caliper

3. Extension of the homologation for new application

For new application that will be included into an existing group, an increase of 10 per cent MAX kinetic energy index (E<sub>p</sub> = kinetic energy [kJ/cm<sup>2</sup>]) is allowed with reference to the value used for the approval of the brake lining assembly of the reference group."

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